

REMARKS

Applicants request favorable reconsideration and allowance of the subject application in view of the preceding amendments and the following remarks.

At this time, Applicants request that the Examiner consider the Fourth Supplemental Information Disclosure Statement filed on November 6, 2003. In this regard, Applicants request that the Examiner initial and return a copy of the PTO-1449 form, which accompanied that paper, indicating such consideration.

Applicants note that the Examiner has withdrawn claims 20-23 from consideration, as being directed to a non-elected invention. Applicants have retained these claims in this application in order to preserve their rights. Applicants request that the Examiner contact their undersigned representative should it be necessary to cancel these claims in order to expedite allowance of the subject application.

To place the subject application in better form, the specification has been amended to correct minor informalities. Also, a new abstract is presented in accordance with preferred practice. No new matter has been added by these changes.

Claims 15, 16 and 19-39 are presented for consideration. Claims 15, 19, 20, 22-25, 27, 33, 36 and 38 are independent. Claims 1-14, 17 and 18 have been canceled without prejudice or disclaimer. Claim 15 has been amended to clarify features of the subject invention, while claims 24-39 have been added to recite additional features of the subject invention. Support for these changes and claims can be found in the original application, as filed. Therefore, no new matter has been added.

Applicants request favorable reconsideration and withdrawal of the objection and rejections set forth in the above-noted Office Action.

Applicants note with appreciation that claims 15, 16 and 19 have been allowed over the art of record. Applicants submit that the minor change to claim 15 does not affect the allowability of that claim. Applicants submit, therefore, that claims 15, 16 and 19 should remain allowable at the outset. In addition to these claims being allowable, Applicants submit that claims 24-39 patentably define features of the subject invention.

Claims 1-3, 5-12, 17 and 18 were rejected under 35 U.S.C. § 102 as being anticipated by U.S. Patent No. 5,973,332 to Muraki et al. Applicants submit that this patent does not teach many features of the present invention as previously recited in these claims. Therefore, this rejection is respectfully traversed. Nevertheless, Applicants submit that claims 24-39, as presented, amplify the distinctions between the present invention and the cited art.

In one aspect of the invention, independent claim 24 recites an electron optical system having a plurality of electron lenses. The system includes a plurality of electrodes which have rectangular apertures for transmitting a charged-particle beam and are arranged in one plane, and a shield interposed between adjacent electrodes.

In another aspect of the invention, independent claim 25 recites an electron optical system having a plurality of electron lenses. The system includes, among other features, an upper electrode having a plurality of rectangular apertures, a plurality of middle electrodes each having a rectangular aperture, a lower electrode having a plurality of apertures and a shield interposed between adjacent middle electrodes.

In yet another aspect of the invention, independent claim 27 recites an electron optical system for a charged-particle beam. The system includes a substrate having a plurality of apertures for transmitting the charged-particle beam and a plurality of electrodes, and a conductive shield interposed between adjacent electrodes.

In still another aspect of the invention, independent claim 33 recites an electron optical system including a plurality of electron lenses. The system includes, among other features, upper and lower substrates each having a plurality of apertures for transmitting a charged-particle beam, a plurality of middle substrates each having at least one aperture for transmitting the charged-particle beam and at least one electrode, the plurality of middle electrodes being arranged between the upper substrate and the lower substrate in a transmission direction of the charged-particle beam, and a conductive shield interposed between adjacent middle substrates.

In yet another aspect of the invention, independent claim 36 recites an exposure apparatus which performs patterning using a charged-particle beam. The apparatus includes a charged-particle beam source for emitting a charged-particle beam, and an electron optical system including a substrate having a plurality of apertures for transmitting the charged-particle beam and a plurality of electrodes, and a conductive shield interposed between adjacent electrodes.

In still another aspect of the invention, independent claim 38 recites an exposure apparatus which performs patterning using a charged-particle beam. The apparatus includes a charged-particle beam source for emitting a charged-particle beam, an electron optical system including upper and lower substrates each having a plurality of apertures for transmitting the charged-particle beam, a plurality of middle substrates each having at least one aperture for

transmitting the charged-particle beam and at least one electrode, and arranged between the upper substrate and the lower substrate in a transmission direction of the charged-particle beam, and a conductive shield interposed between adjacent middle substrates.

Accordingly, in the present invention recited in claims 24-39, a shield, such as a conductive shield, is provided. This shield can prevent influence of a field generated by an electrode from transmitting between one side of the shield and another side of the shield. This feature of the present invention overcomes drawbacks associated with conventional devices, which suffer from a problem of cross-talk.

Applicants submit that the cited art does not teach or suggest such features of the present invention, as recited in independent claims 24, 25, 27, 33, 36 and 38.

The Muraki et al. patent discusses the use of insulators 307-310. Those insulators, however, are made of a non-conductive material, that is, an insulating material. Applicants submit, therefore, that the Muraki et al. patent does not teach or suggest the use of a shield, such as a conductive shield, in the manner of the present invention recited in the noted independent claims.

The Examiner asserts that the Muraki et al. patent teaches, shield means being electrically coupled to, and insulated from the electrodes, with reference to the discussion at column 10, lines 16-24 of that patent. Applicants submit, however, that this discussion merely sets forth that three insulators 307-309 are provided, each having an electrode. As noted in this discussion, the electrodes are wired such that upper and lower electrodes (303U, 303D) can be set at a common potential (as shown in Figure 9) and intermediate electrodes (303M) can be independently set at

different potentials, also as shown in Figure 9. Applicants submit that this discussion in the Muraki et al. patent merely sets forth that the electrodes can be formed on the insulators 307-309. Applicants submit, however, that the insulators 307-310 in the Muraki et al. patent are arranged to insulate the electrodes 303U, 303M and 303D, so as to allow applying desired potentials to the electrodes 303U, 303M and 303D. Thus, Applicants submit that the insulators 307-310 are not made of conductive materials and should not be construed to be the shield or the conductive shield of the present invention recited in the noted claims.

For the foregoing reasons, Applicants submit that the present invention, as recited in independent claims 24, 25, 27, 33, 36 and 38, also is patentably defined over the cited art.

Dependent claims 26, 28-32, 34, 35, 37 and 39 also should be deemed allowable, in their own right, for defining other patentable features of the present invention in addition to those recited in their respective independent claims. Further individual consideration of these dependent claims is requested.

Applicants further submit that the instant application is in condition for allowance. Favorable reconsideration, withdrawal of the objection and rejections set forth in the above-noted Office Action and an early Notice of Allowance are requested.

Applicants' attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should be directed to our address listed below.

Respectfully submitted,

  
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